Coral Reef Ecosystem Research at CCFHR

NOAA/NCCOS Center for Coastal Fisheries and Habitat Research, Beaufort, NC

- Tortugas Ecological Reserve effects of "no take"

- Coral Recovery Modeling

- NC Hardbottom, survey of lionfish

Tortugas habitat characterization

- Integrated assessment of the reserve's effectiveness.

- Why and How changes are occurring through:

  faunal distribution and utilization of coral and adjacent habitats, and

  examining distribution and trophic linkage of primary producers

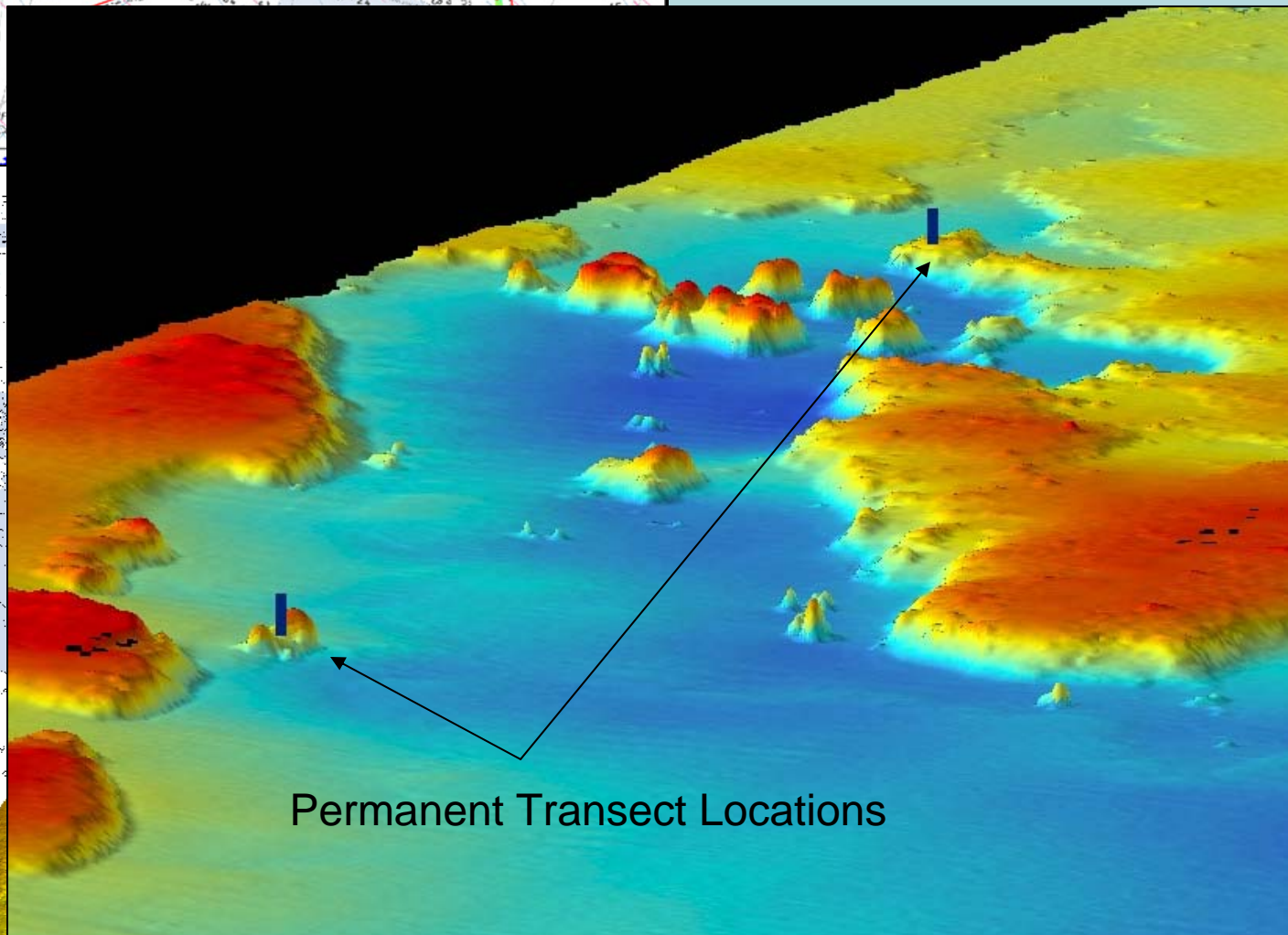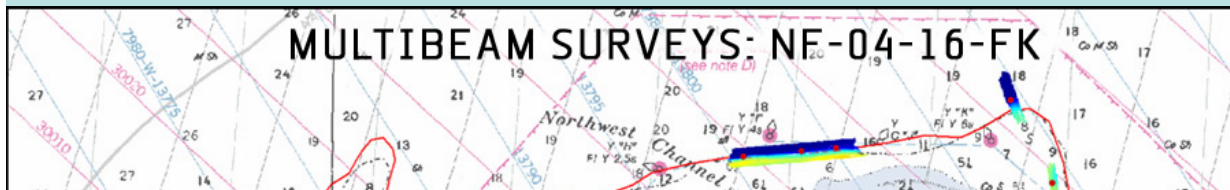 (e.g., corals, seagrasses, phytoplankton, benthic algae).

Additional evaluation of resource, characterization and distribution

• Comparison of remote sensing methods – Ikonos, Quickbird, and aerial photography – together with multibeam sonar
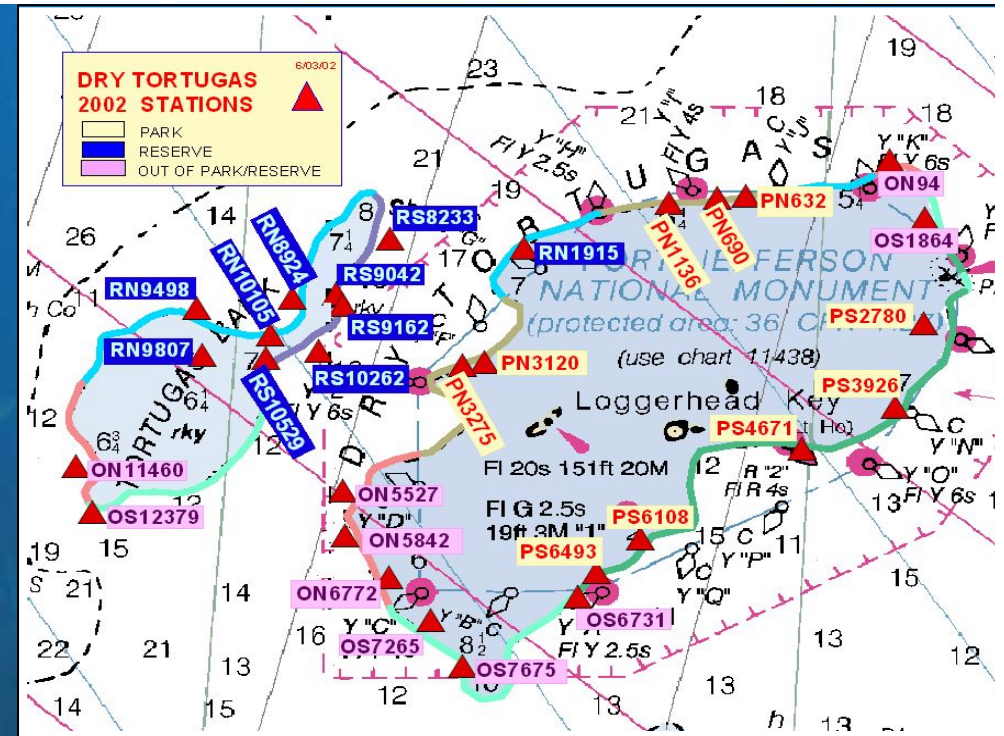
MULTIBEAM SURVEYS: NF-04-16-FK

Permanent Transect Locations

Permanent stations established at reef-sand interface within

- Dry Tortugas National Park
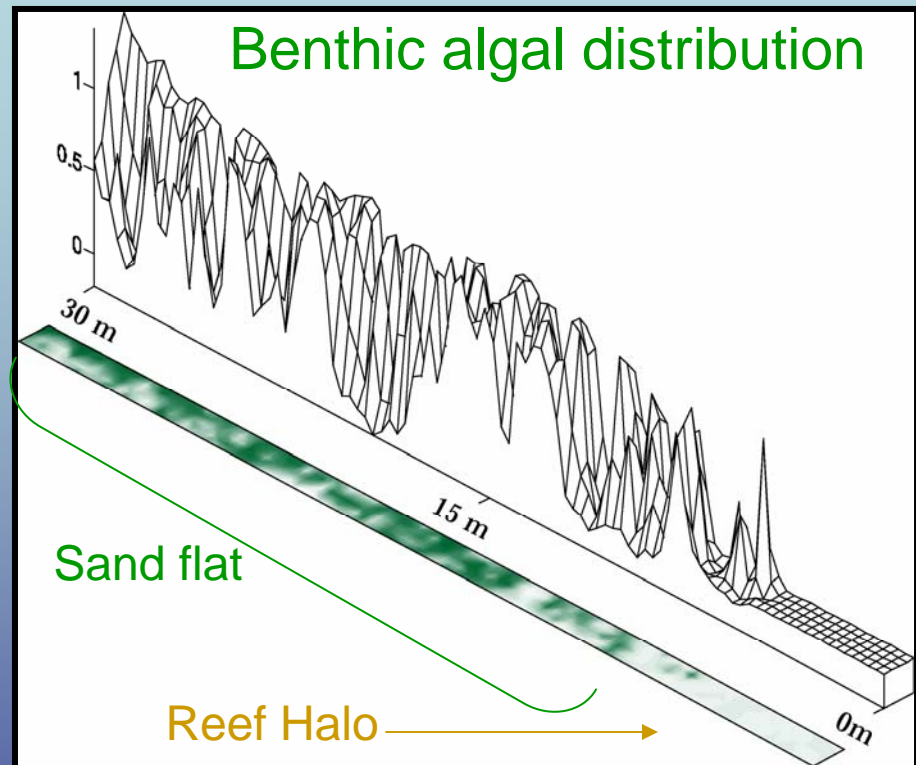- Tortugas Ecological Reserve
- adjacent unprotected areas

Benthic habitat classification

Benthic algal distribution

Sand flat

Reef Halo

Reef classification

Diver surveys and
video analysis

Sand classification

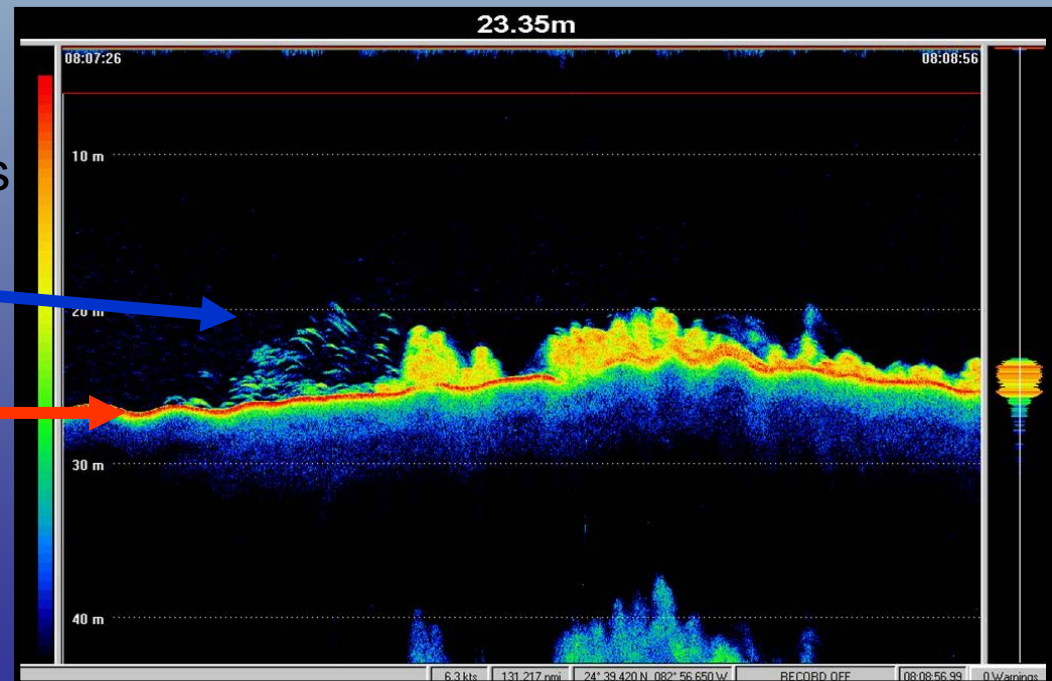Benthic algal distribution
Video analysis

Fish Surveys

Visual fish censuses were conducted along 30 m transects over reef and sand habitats at their interface at each permanent station.

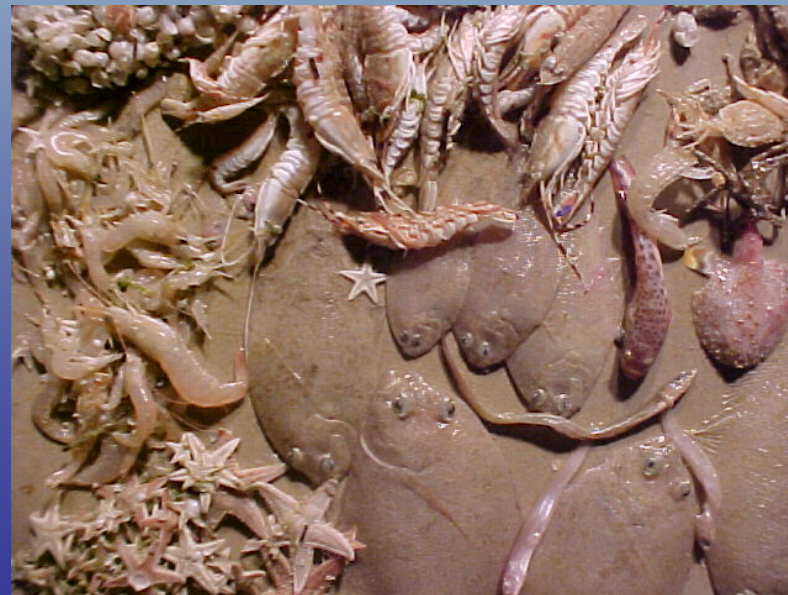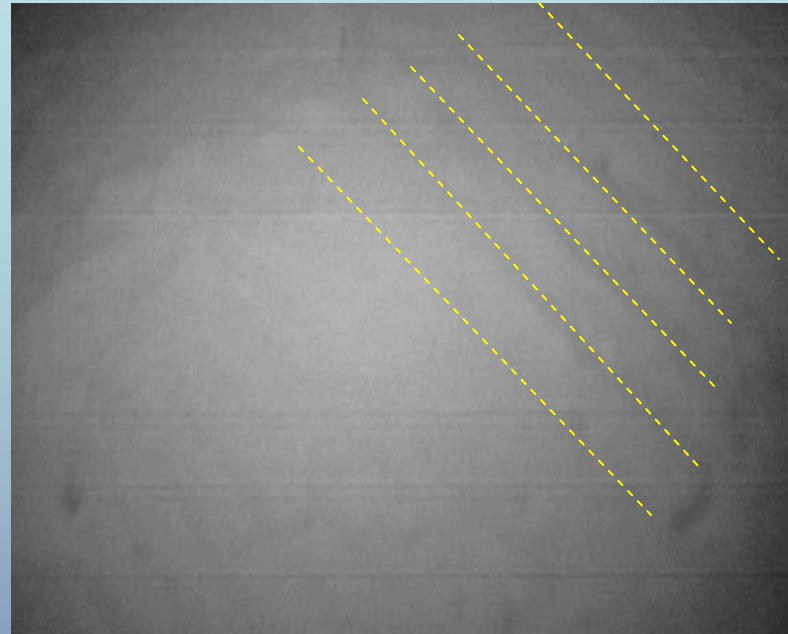A Simrad EQ60 Echosounder was used for remote fish surveys

Fish aggregations

Reef surface

Gear Impact

Soft bottom surrounding the banks was sampled at night for prey species using a fine-mesh beam trawl.

Comparative analysis continues to determine how elimination of commercial shrimp trawling will influence this community.
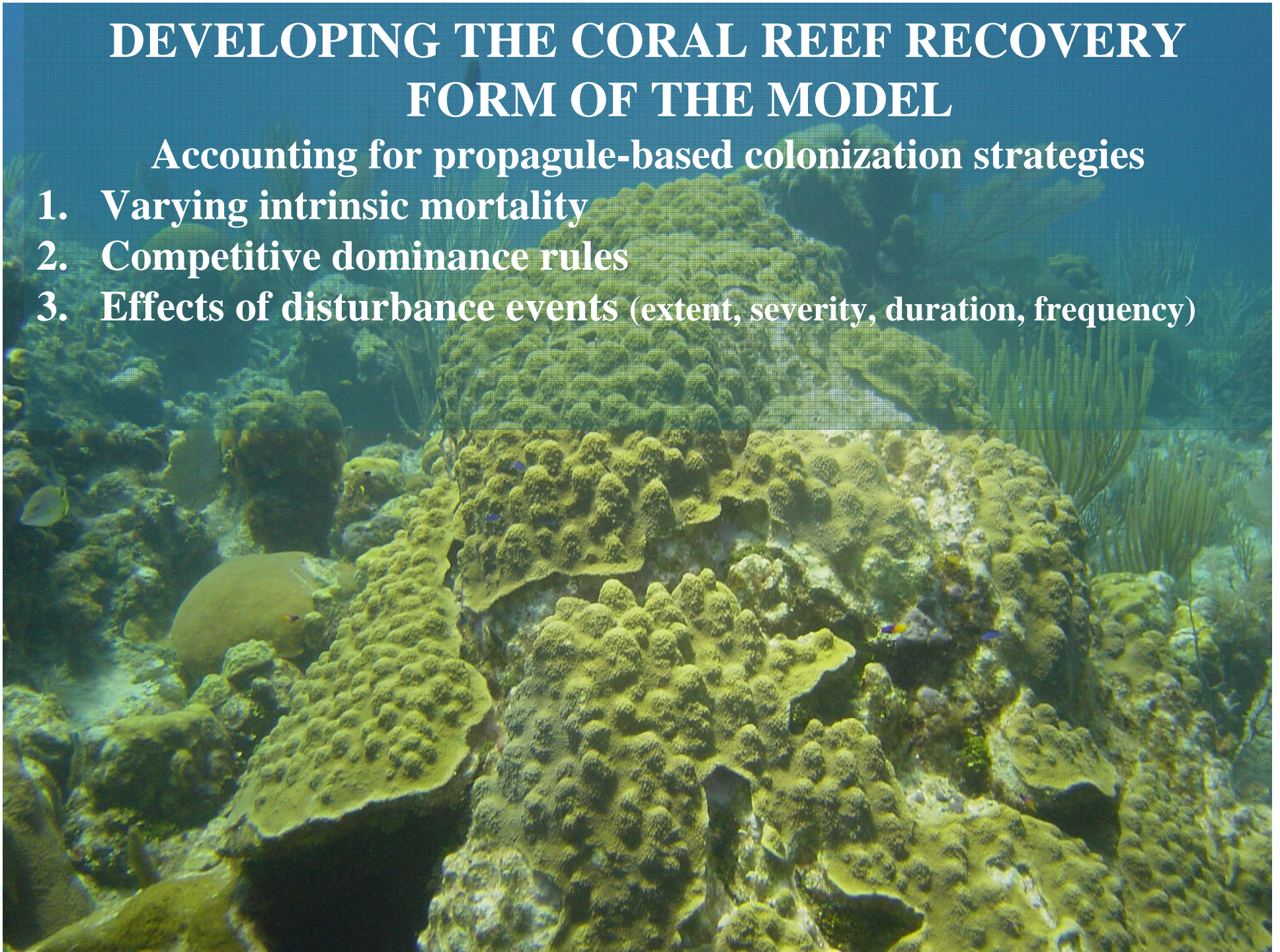
Coral Recovery Model
Developed a spatially explicit coral recovery model to balance biological realism and restoration reality
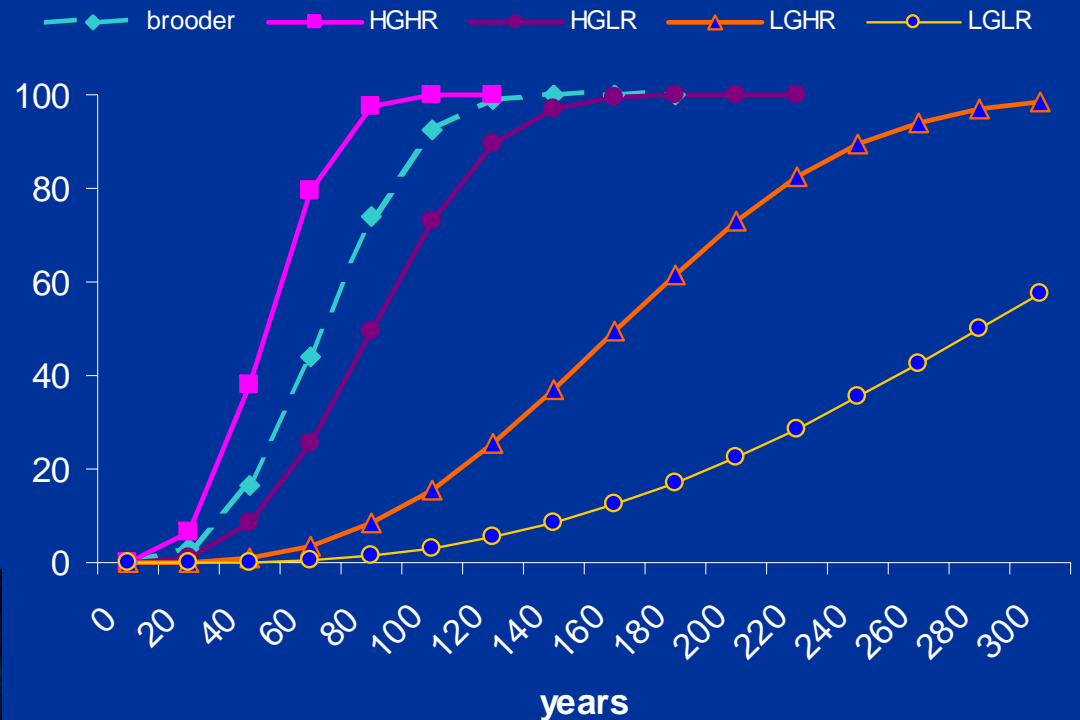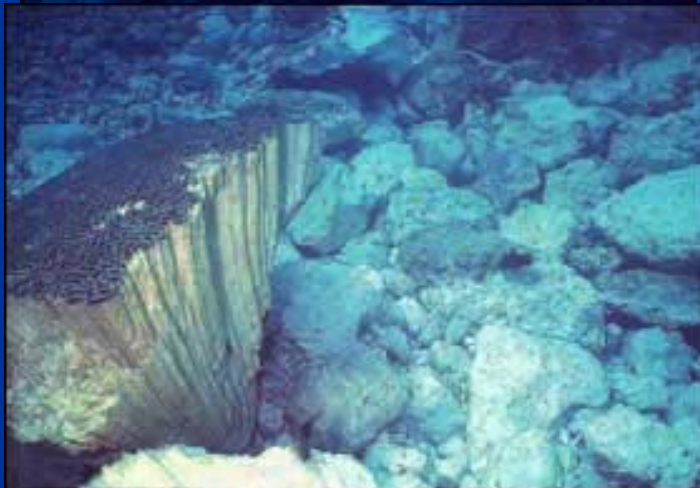
DEVELOPING THE CORAL REEF RECOVERY FORM OF THE MODEL

Accounting for propagule-based colonization strategies

1. Varying intrinsic mortality
2. Competitive dominance rules
3. Effects of disturbance events (extent, severity, duration, frequency)

Coral recovery modeling

M/V *Wellwood*
August 4, 1984

Photos: Florida Keys National Marine Sanctuary

Legend: brooder — HGHR — HGLR — LGHR — LGLR

y-axis: 0, 20, 40, 60, 80, 100

x-axis: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300

years

model	growth	recruitment
brooder (dotted line)	0.5cm/yr	3.0/m²/20yr
High growth/High recruitment 1.0cm/yr	1.0/m²/10yr	
High growth/Low recruitment 1.0cm/yr	0.2/m²/10yr	
Low growth/High recruitment 0.5cm/yr	0.2/m²/20yr	
Low growth/Low recruitment 0.5cm/yr	0.04/m²/20yr	

Injury
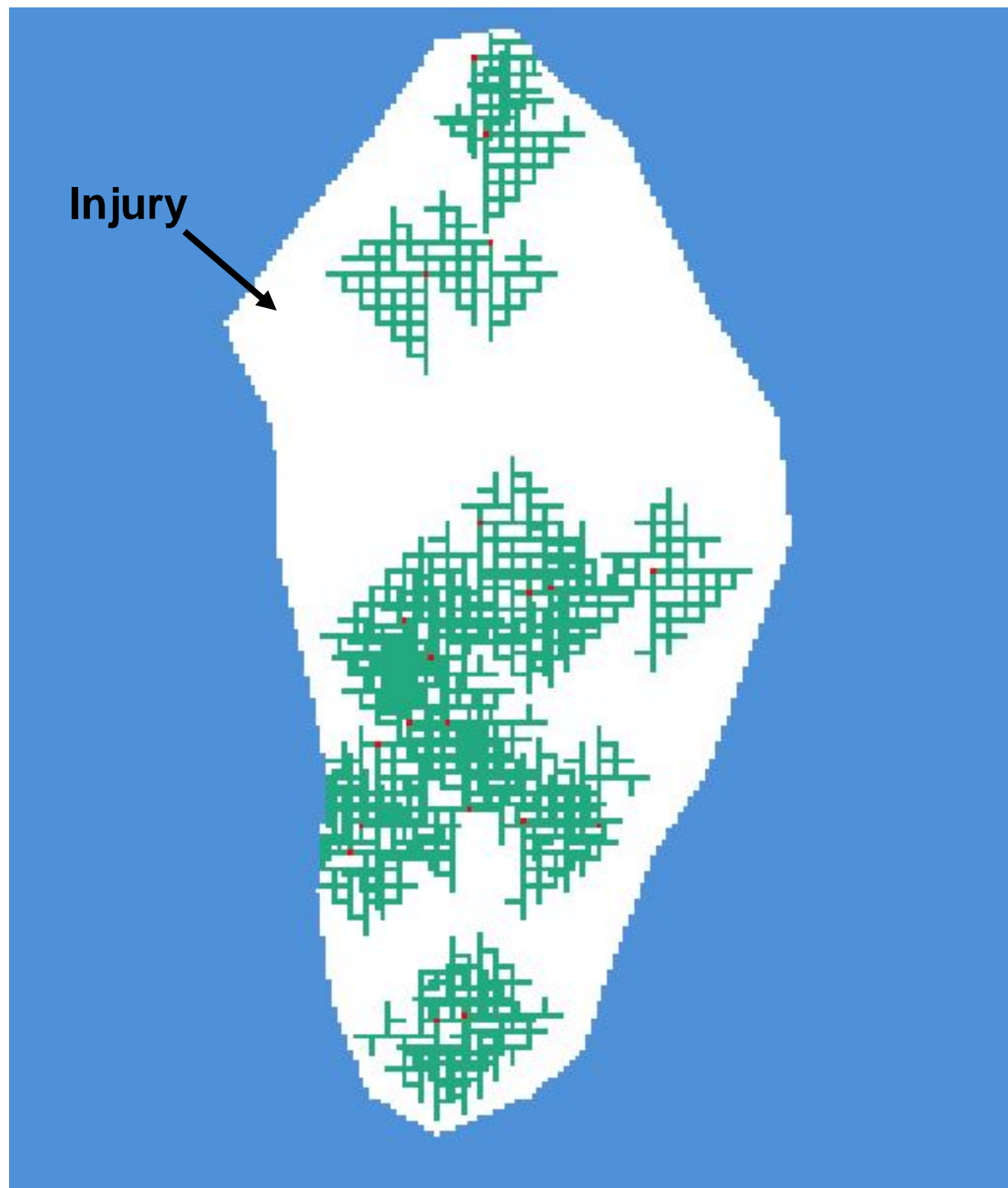
North Carolina hardbottom communities
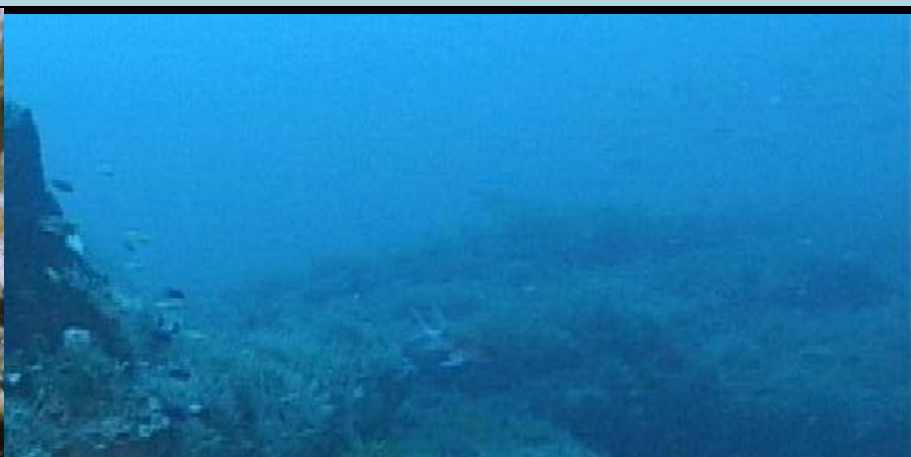
Considered to be the most biologically productive habitat on the continental shelf and supporting a wide variety of fishes and shell fish resources, hardbottom communities form the basis for a variety of economically valuable fisheries
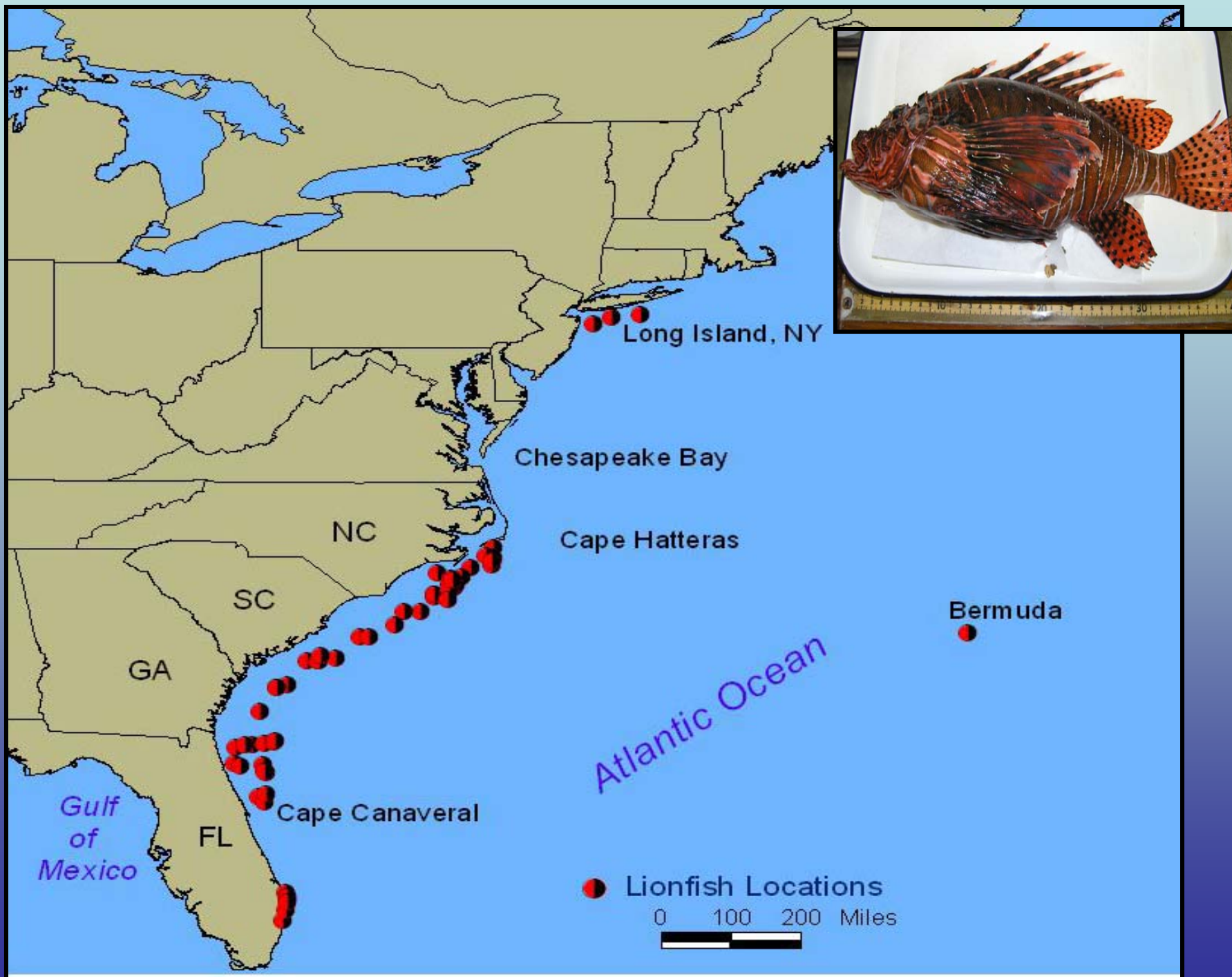
Invasive lionfish are also attracted to these habitats and are now known to be thriving.

CCFHR is examining the ecological role and the possible impact of lionfish to the hard bottom communities and fisheries.

Long Island, NY

Chesapeake Bay

Cape Hatteras

NC

SC

Bermuda

GA

Atlantic Ocean

Gulf
of
Mexico

FL

Cape Canaveral

● Lionfish Locations

0   100   200   Miles

COLLABORATORS

- C.J. Beegle-Krause, NOAA Office of Response and Restoration
- Susan Bell, University of South Florida
- Mark Finkbeiner, NOAA/CSC
- Margaret Hall, Florida Fish and Wildlife Conservation Commission, State of Florida
- Steve Macko, University of Virginia
- Mark Monaco, NOAA/NOS/NCCOS/CCMA
- Jim Reid, Caribbean Science Center, USGS, Gainesville, FL
- Gary Shigenaka, NOAA Office of Response and Restoration